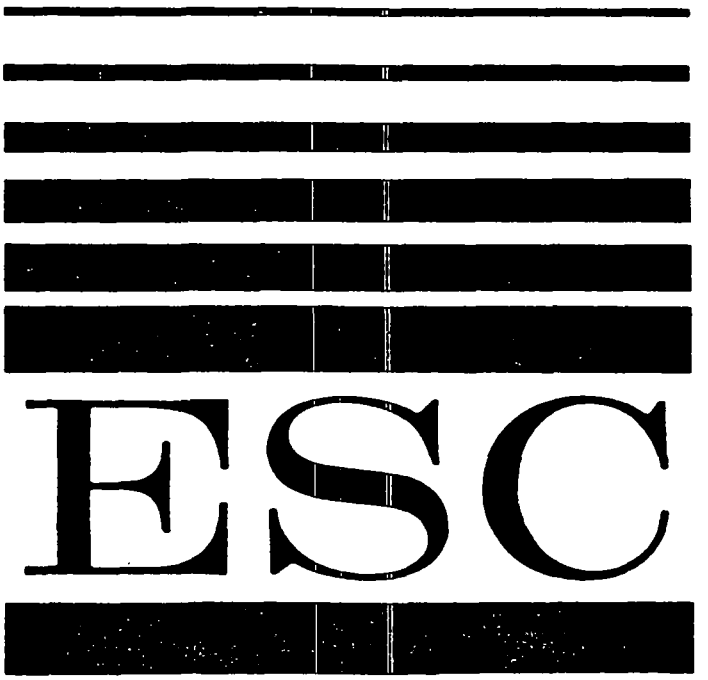
ENVIRONMENTAL STRATEGIES CORPORATION

MASTER METALS, INC.
CLEVELAND, OHIO

ENVIRONMENTAL RISK ASSESSMENT
FINAL REPORT



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ENVIRONMENTAL STRATEGIES CORPORATION
FOUR PENN CENTER WEST
SUITE 315
PITTSBURGH, PENNSYLVANIA 15276-0117
412-787-5100
FAX-412-787-8065

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PREPARED

BY

ENVIRONMENTAL STRATEGIES CORPORATION

FEBRUARY 15, 1991

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Executive Summary

Environmental Strategies Corporation (ESC) performed an environmental risk assessment of the Master Metals, Inc., facility in Cleveland, Ohio. Master Metals operates a secondary lead smelter, which manufactures lead and lead alloys from used industrial batteries, air pollution control dust, lead-containing dross, and other scrap materials. The overall risk of sudden environmental impairment is rated as low-to-moderate, while the nonsudden risk is moderate-to-high.

The site is located on approximately 4.3 acres. The plant was initially constructed by National Lead in 1932 on what was apparently a slag disposal yard for a nearby steel plant. Wastewater generated in the battery decasing area is collected in an aboveground storage tank before being transported to a hazardous waste facility for treatment and disposal. Water collected in the storage tanks includes battery acid and washdown water from the area. All other wastewater, including noncontact cooling water and sanitary wastewater, is discharged to a combined sewer operated by the Northeast Ohio Regional Sewer District (NEORSD). Stormwater runoff and facility washdown water are collected in one of four sumps designed to trap sediments before being released to the combined sewer. In accordance with a compliance schedule approved by the NEORSD, Master Metals intends to install a treatment system for all stormwater runoff, facility washdown, all lead-contaminated wastewaters, and wastewater generated from battery decasing operations.

It is unlikely that operations at the Master Metals facility could affect surface water directly. Indirect affects on surface water could occur as a result of releases of contaminated wastewater or stormwater to the NEORSD sewer treatment plant.

There are several potential sources of groundwater contamination onsite. The property was used as a slag disposal area before National Lead constructed the plant in 1932. Metals may have leached into the groundwater from the slag. The overall poor condition of the unprotected concrete pad beneath the

site combined with historically poor housekeeping practices at the site could have resulted in the contamination of groundwater. However, recently improved housekeeping practices and facility improvements have reduced the risk of releases of lead compounds to soils and groundwater.

A soil and groundwater investigation of the property, conducted in December 1990, indicated that both soils and groundwater beneath the site contain elevated concentrations of lead (i.e., above background). The source of the lead in the groundwater cannot be determined without additional information, although it would appear that the presence of elevated lead concentrations in the soils is attributable to the historical use of the property for lead processing purposes.

Master Metals obtained a U.S. Environmental Protection Agency (EPA) ID number (OHD097613871) and interim status in 1980 for the operation of hazardous waste treatment units, waste piles, and container storage areas. On November 8, 1985, the facility lost interim status for the waste piles, and on January 15, 1990, Master Metals entered into a Consent Decree with the EPA for the closure of the waste piles. The waste piles were removed as of September 1, 1990. The EPA issued fines against Master Metals for the failure to comply with some requirements and deadlines specified in the Consent Decree in September 1990. Master Metals is currently negotiating with the EPA regarding the payment of the fines. Master Metals is also working with the EPA to implement the requirements of the Consent Decree and to obtain a permit for the treatment and storage of hazardous waste.

Master Metals uses two rotary furnaces in its secondary lead smelting process, a 13-foot by 17-foot primary furnace and a 12-foot by 15-foot secondary furnace. Emissions from the furnaces are controlled by three baghouses. A large reworked 38,000-ACFM baghouse is used to filter emissions from hoods over the furnace charge doors. Two new 15,000-ACFM baghouses have recently been installed to control emissions from the 2 furnaces. A smaller baghouse is also used to control emissions from the refining kettles used to refine the ingots obtained from the furnaces.

The major positive features of the facility are as follows:

- The area is served by a central water and sewer system.
- The site runoff is collected and treated before being discharged to the sanitary sewer.
- The facility is scheduled to install a wastewater treatment system for stormwater runoff and battery cracking wastewaters.
- The facility has installed new air pollution control equipment for its point source emissions.
- The plant is in a heavily industrial area that is at least 0.5 mile from residential areas.
- Master Metals has recently employed full-time health and safety and environmental administrators which has resulted in improved housekeeping practices and compliance with applicable health and safety and environmental regulatory requirements.

The major negative features of the facility are as follows:

- The plant's wastewater discharge has not complied with the NEORSD pretreatment requirements.
- Historical lead processing operations and poor housekeeping at the site may have contributed to elevated lead concentrations in the soil and groundwater beneath the property.
- The plant was issued a Notice of Violation for the improper management of its hazardous waste storage units following its most recent Resource Conservation and Recovery Act inspection.
- The U.S. EPA fined the facility for alleged violations of the Consent Decree following inspections of the facility conducted in July and August 1990 (the alleged violations are currently being contested by Master Metals).

Introduction

General

In this report, Environmental Strategies Corporation (ESC) evaluates the potential for the Master Metals, Inc., facility in Cleveland, Ohio, to present a risk of environmental impairment offsite. This report was prepared by ESC to assist Master Metals in obtaining liability insurance. It is based on visits to the Cleveland facility on April 25, 1990, and January 8, 1991. Marc Jones, former Environmental Scientist of ESC, visited the site on April 25, 1990. Scott Van de Mark, Environmental Scientist of ESC, visited the site on January 8, 1991, and is the principal author of the report. He was assisted on the site visit by Mr. Rudy Zupan, Environmental Administrator, and Mr. Douglas Mickey, owner and President of Master Metals. ESC also reviewed documents provided by Master Metals and spoke with representatives of environmental regulatory agencies in the preparation of this report. Photographs of the facility are provided in Appendix A.

The environmental risk presented by a facility is its potential to create environmental exposures, which can be actual or potential impairment, claims, liabilities, or exposures. Four risk factors, Pathways and Controls, Populations at Risk, Toxicity and Behavior of Materials, and Management and Practices, are analyzed and rated from low to high. Integrating the four factors allows a determination of the risk presented by the facility overall.

ESC ranks each factor and the facility separately for the potential to present sudden and nonsudden environmental risks. The difference between sudden and nonsudden impairment is based on the duration of the events that contribute to the risk, which is not necessarily the amount of time necessary for impairment to travel offsite. Sudden impairment results from single, abrupt events, while nonsudden impairment results from gradual events or repeated, abrupt events. For example, a single discharge of a toxic material would result in sudden impairment, but the regular occurrence of the same discharge would

be nonsudden impairment. This evaluation of the duration of risk is conducted for the purpose of insurance underwriting.

Disclaimer

Portions of this report are based on documents and oral information supplied by Master Metals. ESC has not independently verified this information. While this report is accurate to the best of ESC's knowledge and belief, ESC cannot guarantee the completeness or accuracy of any description or conclusions based on the supplied information.

Risk Factors

Pathways and Controls

Pathways and controls examine the routes through which materials could move off the premises of the facility and what controls are in place to inhibit movement through those routes. The pathways evaluated include the surface water, ambient air, groundwater, and soils. The potential for contamination of all groundwater is considered, even that beneath the facility. The existence, design, and effectiveness of any pollution control devices or natural features of the site are evaluated to determine the extent to which they reduce the escape of materials through the pathways.

Populations at Risk

The second factor is an assessment of the risk to the populations at risk from materials escaping the facility. The sensitivity of the environment around the facility is evaluated. While health impacts on human populations are emphasized, the potential for impairment of natural populations or resources also is reviewed. The risk to the populations is evaluated with respect to the existing state of the ambient environment. The impacts from other facilities in the area, the potential to be implicated in local

environmental problems, and the perception of the facility in the community are all part of the determination of the risk to populations.

Toxicity and Behavior of Materials

The materials that are most likely to escape from the facility are evaluated to determine their potential to cause health or environmental problems. The materials assessed include raw materials, intermediates, contaminants, and waste products from past, present, and future operations. ESC evaluates the materials for their health effects through acute and chronic exposures, the quantities present or generated, and their environmental fate. The descriptions of the materials include effects through all modes of environmental exposure, but the risk is based on the pathways of exposures relevant to the facility. The assessments of the materials are based on reviews of the secondary literature. Areas of current controversy concerning health effects are discussed but are not deemed to mitigate the risk.

Management and Practices

Management and practices examine how the operations and personnel of the facility work to exacerbate or diminish the environmental risks. Assessment of this factor also involves examining those areas that could be indicative of the state of environmental practices at the facility. Facility management is rated on how well they understand and evaluate environmental exposures and on their general compliance with environmental regulations. Management's readiness and ability to prevent and respond to accidents that could lead to environmental exposures is assessed. Housekeeping, equipment maintenance, inspection procedures, and workplace safety are used as indicators of management attitudes. Past practices relating to environmental controls and waste disposal are incorporated into the evaluation of current practices. Liabilities arising from the disposal of wastes offsite are not factored into this assessment.

Overall Risk

The four factors interact with each other to determine the risk presented by a facility. The threat from a high risk for one factor can be lessened by low risks for the others or can be reinforced by other high risks. Thus, the overall risk is based on the integration of the data contributing to each individual risk. It is a qualitative assessment of the potential for environmental exposures, impairment, liabilities, or claims from a facility.

Description of the Master Metals, Inc., Facility in Cleveland, Ohio

General Description

Master Metals operates a secondary lead smelter that manufactures lead and lead alloys from lead-bearing dross, spent industrial batteries, and various other lead scrap materials. The company's only facility is located at 2850 West 3rd Street in Cleveland, Ohio (Figure 1). The site consists of approximately 4.3 acres. The plant has a number of contiguous and noncontiguous buildings with approximately 32,000 sq ft under roof. Master Metals typically employs 50 people, 40 of which are production employees and 10 of which are office workers. The plant operates three shifts per day, seven days per week.

Initial operations began at the present location of the facility in 1932. At that time, National Lead built the plant on what was probably a slag disposal area for LTV Steel Company, Inc. The present owner of the plant, Mr. Douglas Mickey, purchased the property from National Lead on September 7, 1979. According to facility personnel, National Lead operated a secondary lead smelter from 1932 until Master Metals purchased the plant in 1979. No specific information concerning National Lead's operations was available.

There have been several modifications to the plant since its purchase in 1979. Most recently, a new rotary furnace along with two new baghouses were installed in 1989. The plant also recently underwent a large-scale improvement project for the control of stormwater in the yard area. In addition, Master Metals recently constructed a 7,000-sq ft building that houses the plant offices as well as employee locker rooms and shower facilities.

The site is located in a heavily industrial area. Rail yards for the Baltimore and Ohio Railroad border the property on the east and west. LTV Steel is the plant's nearest neighbor to the north and south.

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Pittsburgh, Pennsylvania 15276
412-787-5100

Figure 1
Location of the Master Metals, Inc.,
Facility in Cleveland, Ohio

Residential housing is located approximately 0.5 mile northwest of the facility. No residences are within one mile of the facility's northern, eastern, and southern borders.

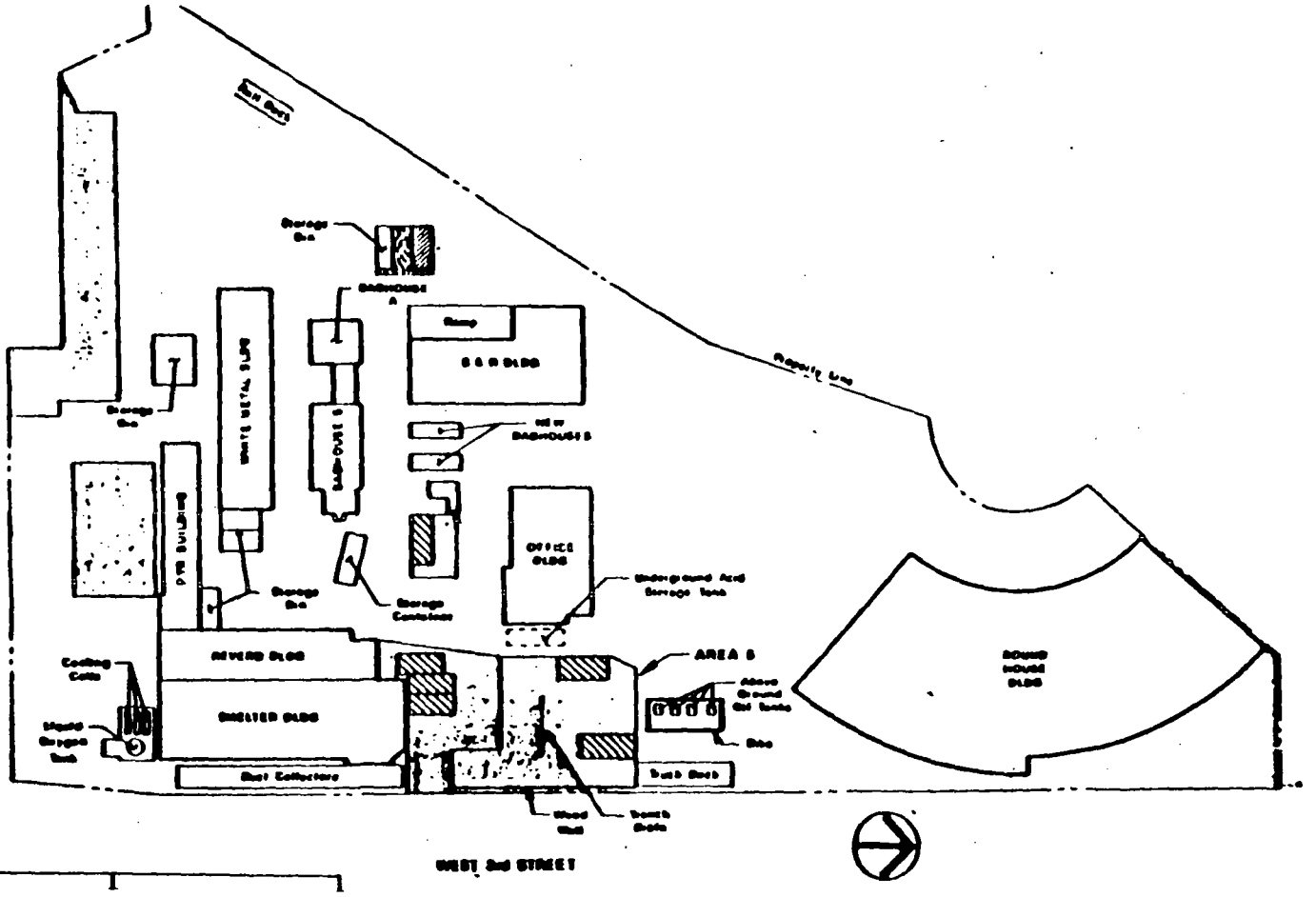
The major features of the site include the following (Figure 2):

- the office building
- the furnace building
- a storage building
- a lead alloying operation building called the white metal building
- two new baghouses for the furnaces and a large brick baghouse
- the shipping and receiving building
- the roundhouse building, which houses the metal extrusion processes
- a small tank farm for petroleum products
- the battery cracking area in the facility yard
- a batch wastewater pretreatment system
- bulk and drum storage areas

The raw materials used by the facility include steel-cased batteries, soda ash, cast iron borings, petroleum coke, silica sand, and various lead-containing materials, including lead solder dross, baghouse dust, and scrap lead.

The soda ash is stored in a silo located north of the furnaces. The petroleum coke, silica sand, and cast iron borings are stored in piles. Baghouse dust is stored in nylon bags in a 90 cu yd steel bin. All other materials are stored in bins and drums. According to facility personnel, the soda ash and cast iron act as flux in the furnace charges. The coal fines act as fuel and are added along with the charges.

Compressed gas stored onsite is located in several areas. A liquid oxygen tank is located at the southeastern corner of the facility. Acetylene, oxygen, and propane are stored in gas cylinders. These gases are used mainly for welding in the plant's maintenance shop located in the roundhouse.



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Approximate Scale in Feet

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Figure 2
Layout of the Master Metals, Inc.,
Facility in Cleveland, Ohio

Master Metals is a resource recovery facility that is involved in the operation of a secondary lead smelter and manufactures lead and lead alloys from lead-acid, steel-cased batteries, and various other materials containing lead. The incoming batteries are typically received on wooden pallets. The solder dross, scrap lead, and other lead-containing material are received and stored in bulk and drum storage units. Approximately 25,000 tons of material are received and reclaimed by the facility each year. About one-half of that weight is batteries, and the other half is other lead-containing materials.

The steel-cased batteries are cut open with an acetylene torch, and the lead plates are extracted and staged in outdoor bins located at the northeastern portion of the property for later processing. The battery acid drains out and is handled as discussed below. The lead battery plates and other lead-containing materials are melted down in one of the plant's two rotary furnaces. The furnace charges or feed materials consist of lead-containing materials, soda ash, cast iron borings, petroleum coke, and sand. Master Metals also uses filter bags from the plant's baghouses, baghouse dust, sludge from the wastewater treatment system, and dross from its refining operations as feed stock for its furnaces.

From the furnaces, large round ingots approximately 2 feet in diameter and 10 inches thick are produced. These ingots are melted down further for refining and then shaped into various sizes. Several kettles are located in the white metal building and are used to manufacture the various sized ingots. In addition to the pure lead ingots, the plant produces alloys of lead that range from 2.5% to 6.0% antimony. The antimonial lead is produced in kettles in the white metal building. The facility operates an extrusion process in the roundhouse at the northern end of the property where lead is extruded to different shapes and sizes depending on the customers specifications.

Master Metals does not operate any underground fuel storage tanks. Two 500-gallon underground tanks for diesel fuel and gasoline were operated until December 23, 1988. Master Metals had the tanks excavated and disposed of offsite. According to the company president, the local fire marshal inspected

the excavation pits, but no verification soil samples were collected. No evidence that the tanks had leaked was observed by facility representatives or the fire marshal.

Four aboveground tanks are maintained in a small tank farm north of the battery cracking area. The tank farm is equipped with a concrete secondary containment structure. The secondary containment appeared on observation to have a capacity greater than the total capacity of all four tanks (i.e., 2,000 gallons). The tank farm consists of three 550-gallon tanks storing diesel fuel, hydraulic fluid, and gasoline and one 250-gallon waste oil tank. These tanks store fuel and fluid used by the facility to service its vehicles and lift trucks. No polychlorinated biphenyl (PCB) analyses have been conducted on the hydraulic oil. In addition, a liquid oxygen storage tank is operated at the southeastern corner of the property behind the furnace building. The plant has obtained permits for all of these tanks from the Cleveland Department of Public Safety.

Wastewater and Stormwater Systems

Master Metals obtains its potable and process water from the city of Cleveland. The city draws its water from Lake Erie. The current rate of water use by the facility is 66,000 cu ft (493,680 gallons) per month for the plant and 62,000 cu ft (463,760 gallons) per month for the office for a total of 957,440 gallons per month. The total daily rate for the water use is approximately 31,000 gallons.

Approximately half of the water supply for the plant is used as noncontact cooling water. The remainder is used for showers and other sanitary water. The wastewater and stormwater from the plant, except for battery cracking wastewaters which are collected for offsite treatment and disposal, are discharged to a combined sewer system operated by the Northeast Ohio Regional Sewer District (NEORSD). The district's treatment plant is located approximately five miles from Master Metals. Its effluent is released to Lake Erie.

According to facility personnel, the only sources of the plant's process wastewater are residual battery acid and noncontact cooling water from the casting tables. As part of the facility's procedure for obtaining the lead plates from the batteries, residual sulfuric acid is allowed to drain onto the concrete surface in the battery cracking area. No batteries were decased during the site visits; however, Master Metals described the decasing operation. Facility representatives said that the batteries are cut using an acetylene torch. Employees wear protective clothing, including faceshields, aprons, and gloves, during the decasing operations. The acid flows over the ground to an open concrete channel and is transported by gravity flow through a polyvinyl chloride (PVC) underground pipe to a sump. This material is then pumped to aboveground 1,200-gallon and 1,500-gallon storage tanks. Once per month, the contents of the sump and 2 storage tanks, approximately 4,000 gallons, are collected by Clean Harbors, Inc., of Cleveland, Ohio, as hazardous waste for treatment and disposal. Before October 1990, this wastewater was treated onsite in the facility's former wastewater treatment system. The facility washes down the battery decasing area once each day, and the washwater is allowed to flow into the collection sump where it becomes mixed with the battery acid.

The collection sump consists of a concrete truck scale pit lined with a synthetic liner. The sump has a capacity of approximately 6,000 gallons. The facility began using the pit as a collection sump in 1988. Before 1988, Master Metal's battery cracking operation took place in the area where the new baghouses have been built. This operation was conducted on an unlined concrete pad. The acid was collected in an aboveground tank and neutralized before being released to the city sewer.

Before 1989, the facility had neutralized the wastewater collected in the sump with a manual chemical feed before discharging it to the NEORSD combined sewer. As a result of the exceedences of the sewer use code pretreatment limits by Master Metals, the NEORSD issued an Administrative Order to the facility in the spring of 1989 (Appendix A). According to the Order, the plant had failed to comply with the concentration limits for pH, copper, zinc, cadmium, and lead. The Order indicated that Master

Metal's pretreatment system was inadequate and that rainwater runoff from the facility may contain heavy metals.

Under provisions of the Administrative Order, the NEORSD required Master Metals to install a new wastewater pretreatment system and to provide further engineering controls for its runoff. The order required Master Metals to construct collection sumps at all rainwater catch basins that are large enough to allow for the precipitate of metal solids before overflow to the sewer system. The order also requires Master Metals to maintain the sumps to eliminate the potential of overflow of precipitants to the sewer. Master Metals installed four sedimentation sumps and a pretreatment system as a result of the Order. The pretreatment system was dismantled in October 1990, due to difficulties in meeting the NEORSD pretreatment standard for lead.

The former pretreatment system was a batch type physical-chemical treatment system, and the plant treated approximately 6,000 gallons of water per month. The treatment system consisted of a 6,000-gallon collection sump, a 1,200-gallon mixing tank, a 1,500-gallon clarifier, and a 5-cu ft filter press. The mixing tank and the clarifier are currently used as storage tanks for battery acid and rinsewaters before shipment offsite for treatment and disposal. The former treatment system consisted of elementary neutralization and metals precipitation. Liquid caustic was added to the tank until the pH of the wastewater was between 8 and 9. A coagulant was also added to the water to aid in the sedimentation process. The facility allowed the water to settle in the clarifier for 24 hours and then discharged it to the sewer. The solids generated in the clarifier were pumped to the filter press where they were dewatered. The filter cake was treated in one of the furnaces.

The effluent from the facility is regulated under local ordinances (Appendix C) and federal regulations. The facility monitors the influent and effluent for pH only. According to facility personnel, a pretreatment agreement from the city is not required, and no discharge limits have been set by the district. Master Metals does not routinely monitor the discharge for heavy metal content. The NEORSD

monitors the facility's discharge on a regular basis; however, according to the sewer district, the facility's effluent is not presently in compliance with its standards or federal categorical pretreatment standards.

In an effort to bring the facility's wastewater discharges into compliance with both local and federal pretreatment standards, Master Metals has agreed to a wastewater compliance schedule with the NEORSD (Appendix D). According to the schedule, Master Metals will install an operational treatment system by the end of 1991. Based on the results of a baseline wastewater monitoring program conducted in August 1990, the following waste streams contain levels of lead in excess of the NEORSD standard: truck wash, employee respirator wash, employee handwash, facility washdown, and battery cracking wastewaters (Appendix E). The planned treatment system will be designed to treat these flows as well as stormwater runoff. Master Metals has employed a local engineering firm to conduct an engineering study of the facility in order to develop preliminary design specifications for wastewater treatment system alternatives. The engineering firm was scheduled to complete the study by February 1, 1990. As of February 1, the study had not been completed. The proposed treatment system will reportedly be designed in accordance with federal categorical standards as well as NEORSD standards. The federal pretreatment guidelines are for existing source secondary lead smelters, 40 CFR 421.135.

Depending on the location, stormwater control varies. Within the battery decasing area, all runoff is collected in the area's collection sump for storage before transport to an offsite treatment facility. The other plant areas are sloped toward one of four stormwater catchment basins. These stormwater collection sumps are designed to allow sediments in the runoff to settle out before the water is discharged to the city sewer. According to Master Metals, the solids are routinely cleaned out of the sumps and treated in the furnaces. Eventually, all stormwater runoff will undergo treatment before discharge to the combined sewer system according to the wastewater compliance schedule.

The facility stated that, other than occasional spills of solid materials such as solder dross, no spills have occurred at the plant. On some occasions, a drum may have been knocked over and released dry material onto the pavement. These incidental spills are quickly cleaned up according to Master Metals.

On the day of the site visit, the tank farm was observed to contain stormwater. A visible sheen on the water and staining on the tanks indicated that releases routinely occur while loading the tanks. The facility reportedly intends on contracting with a local oil reclamation facility to remove, treat, and dispose of the accumulated stormwater in the containment structure. After the liquid has been removed, Master Metals intends on steam-cleaning the interior surfaces of the tank farm. The containment should be inspected for integrity and be repaired as necessary. In addition, a drainage valve should be installed at a low point in the tank farm to allow uncontaminated stormwater to drain from the tank farm following storm events.

No liquid wastes are accepted from offsite. The facility accepted chlorinated solvent hazardous wastes (EPA waste no. F001) at one time according to the facility's Resource Conservation and Recovery Act (RCRA) Part A permit application. These materials were a one-time shipment that the facility received by mistake from a customer. Master Metals said that the wastes were removed from the site and disposed of properly by the customer. Master Metals notified the U.S. EPA concerning the mistake. The material was stored in drums onsite for a few months before being removed.

According to Master Metals, there are no complaints, citations, or claims against the company related to its wastewater management.

Solid and Hazardous Waste Systems

Master Metals's EPA ID number is OHD097613871. The facility initially obtained interim status for the operation of hazardous waste treatment units, waste piles, and container storage areas on November 19, 1980. On November 8, 1985, the facility lost interim status for the waste piles, and on January 15,

1990, Master Metals entered into a Consent Decree with the U.S. EPA for the closure of the waste piles (Appendix F).

Master Metals filed a Part B permit application with the Ohio EPA for the operation of a hazardous waste treatment and storage facility. The most recent revision was submitted on April 9, 1990. Master Metals is awaiting comments on the revised application, which includes a partial closure plan for its former waste piles. All of the contents of the waste piles were placed in drums and storage bins by September 1, 1990. The locations of the former waste piles are indicated in Figure 2.

The facility receives baghouse dust (K069), which contains approximately 40% to 60% lead, from offsite lead processing facilities. In addition to the K069 wastes, Master Metals receives and treats materials that are characteristic hazardous wastes because of their leachable lead concentration. These materials include lead dross, industrial batteries, scrap, and other residuals that are lead-bearing wastes. Other nonhazardous recyclable materials are also received at the facility.

Wastes that are generated by the facility include the following:

- fire brick from the two furnaces
- slag
- baghouse dust
- spent baghouse filters
- wooden pallets
- sediments from the stormwater catchment basins
- empty drums
- steel cases from the batteries
- sulfuric acid from the batteries

Of these materials, only the scrap steel cases, drums, and fire brick are not routinely treated in the furnaces. The slag is tested by the Toxicity Characteristic Leaching Procedure (TCLP) method, and if it

passes, the facility disposes of it in either a Browning Ferris Industries (BFI) landfill or the Harry Rock Landfill in Cleveland. If the slag is hazardous, Master Metals uses it as flux in its furnaces.

The scrap steel drums and cases are sold to A. Shaw Scrap and Recycling Company. The fire brick in the furnaces is replaced every five months. If the material is not EP toxic, it is shipped to BFI or Harry Rock. If it is hazardous, it is shipped to Chem-Met Services for land disposal in Wyandotte, Michigan. According to facility personnel, the only liquid waste generated by the facility other than the battery acid and wastewater is used crankcase and hydraulic oil from the forklifts. The used oil is collected and treated by Research Oil Company in Cleveland, Ohio.

ESC reviewed the U.S. EPA's National Priorities List (NPL) and Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) data base to determine the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) status of the facility and the offsite disposal facilities it uses. None of the four facilities that Master Metals used, and Master Metals itself, is listed or proposed for the NPL; however, they are all listed on CERCLIS. A preliminary assessment of Master Metals was conducted in September 1984, and the U. S. EPA determined that no further action was required. A site inspection was conducted at Chem-Met Services in July 1985, and the U.S. EPA determined that no further action was required. Preliminary assessments have been conducted at the BFI and Harry Rock landfills. The Research Oil Company site was first listed on CERCLIS in 1988. A decision has not been made on the need for further action at these three sites. Clean Harbors was not listed or proposed for the NPL or listed on CERCLIS.

Master Metals has developed a waste analysis plan for the wastes received from offsite as part of its Part B application. The plan includes documentation reviews, chemical analyses, and pilot test runs. The most recent revision to the plan was submitted to the Ohio EPA on April 9, 1990. The state has not completed its review of the new plan.

Master Metals has a number of stormwater catch basins designed to collect solids before discharging the stormwater to the city sewer. The sediments in the basins are cleaned out every three months. The solids are treated in the furnaces.

Sulfuric acid is generated as a result of the battery decasing process. As previously mentioned, when the lead plates are removed from the batteries, the acid is allowed to flow onto the ground, through an open concrete channel, and eventually drains into a sump. Stormwater runoff from this area and washdown water are also collected in the sump. The resulting wastewater is currently collected in aboveground tanks before shipment offsite to Clean Harbors for treatment and disposal. The wastewater is manifested as a characteristic hazardous waste (D002). Although this is a temporary practice until a permanent onsite wastewater treatment system can be installed. ESC believes that the collection sump and storage tanks currently qualify as hazardous waste storage tanks pursuant to 40 CFR Part 265 Subpart J. It is recommended that Master Metals comply with these regulations or inquire with the Ohio EPA if the collection sump and storage tanks are subject to RCRA standards, and if the facility is obligated to comply with any other RCRA standards concerning this activity.

Hazardous and solid wastes received at the facility are stored in either bulk or drum storage. The bulk materials are stored in bins. During the January 8, 1991 site visit, all of the storage bins were covered and closed, except for bin no. 5 which contains charge materials including some lead-containing hazardous wastes. This bin is in use on a continual basis. According to the facility, the bins are covered with tarps and their doors are closed except when in use. Under federal regulations found at 40 CFR 260.10, container is defined as a "portable device in which a material is stored, transported, treated, disposed of, or otherwise handled." Many of the bins have a capacity of 90 cu yds and did not appear to be portable. However, the bins are approved by the U.S. EPA as hazardous waste containers as stated in the Consent Decree. Master Metals should cease the storage of hazardous waste in any of the bins that

do not meet the definition of container as specified in the Consent Decree. An inventory, as of January 8, 1991, of the bins and their contents is included in Appendix G.

Requirements for the management of hazardous waste containers under Subpart I of 40 CFR 264 and 265 also require that a container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste. The facility should ensure that hazardous waste storage containers comply with this requirement.

The facility is inspected on a routine basis by the Ohio EPA. The most recent inspection was conducted by Mr. Mark Bergman of the Ohio EPA on March 26 and 27, 1990. The inspection report (Appendix H) identified seven violations:

- failure to mark satellite accumulation containers with the words "Hazardous Waste"
- failure to mark each of the hazardous waste bins with signs that indicate "Danger - Unauthorized Personnel Keep Out"
- lack of documentation concerning the acceptance or refusal of the contingency plan from several local emergency services authorities
- failure to include the quantities of lead-contaminated fire brick, lenox waste clay, and battery case waste in the operating record
- improper management of the hazardous waste storage bins
- improper management of the hazardous waste storage drums
- improper management of the lenox clay waste pile and the adjacent lead residue waste pile

Additional concerns expressed by the state included the presence of empty drums placed in various locations around the plant with hazardous waste labels from other facilities on them. The inspector also specifically mentioned that Master Metals was storing spent fire brick in drums that were still marked with labels from previous generators.

Of the violations cited by the Ohio EPA, the last three present the greatest potential environmental risks. On the day of the Ohio EPA inspection, several of the bins were left open allowing dust from the bins to disperse. The Ohio EPA indicated in the report that many of the drums containing hazardous waste were also left open.

A large puddle of battery acid was allowed to stand in the battery decasing area the day of the Ohio EPA inspection. This acid is likely a characteristic hazardous waste.

According to the Ohio EPA report, two existing waste piles remained onsite, the lenox (china clay) waste pile and the old battery case waste pile. The Ohio EPA indicated that the old battery case waste pile had a significant amount of lead residue mixed with the battery cases. The old battery case waste pile was not covered the day of the Ohio EPA inspection. The waste pile was not equipped with engineered controls for stormwater runon and runoff. The Ohio EPA report also stated that it had not been determined whether the underlying base is impermeable. Overflow from the waste pile onto the adjacent railroad siding was noted by the Ohio EPA inspector. Lead-containing material was removed from this area in September 1990.

As of August 1, 1990, all of the materials in the two waste piles were placed in drums or bins for eventual use in the facility's furnaces in accordance with the Consent Decree. According to the current operating record, over 50% of the contents of the china clay waste pile and all of the battery case waste pile had been placed in the furnaces to recover its lead content by December 31, 1990.

The facility has improved its management of hazardous waste storage bins and drums. All of the hazardous waste drums and bins, except for the furnace charge storage bin, as discussed earlier, were observed to be covered and closed during the January 8, 1990 site visit. As a result of improved housekeeping practices, there was little, if any, spilled lead waste observed in any of the hazardous waste storage areas.

Master Metals has included the quantities of lenox waste clay and lead-contaminated fire brick in the facility's hazardous waste operating record. Master Metals has also implemented an internal computerized tracking program for all lead raw material streams except for batteries and identifiable scrap received at the facility. All drums and bins of lead containing hazardous waste are assigned a reference number and are affixed with a sticker to enable proper tracking of the hazardous waste inventory. As material is deposited in the furnaces, the operating record and the computer tracking system are amended accordingly.

The facility is currently awaiting approval from the Ohio EPA for its contingency plan before submitting it to local emergency service authorities for acceptance. The contingency plan is included in the facility's Part B permit application which was most recently submitted to the Ohio EPA on April 9, 1990.

All of the contaminated residue remaining on the rail siding was removed by September 1, 1991, and placed in drums for disposal in the facility's furnaces.

The closure of the hazardous waste piles was conducted in accordance with a proposed partial closure plan as required by the Consent Decree. As part of the closure of the hazardous waste piles, Master Metals conducted a soil and limited groundwater investigation in December 1990 of the soils and groundwater beneath and adjacent to the former waste piles. The concrete pad underlying the former waste piles was observed to be mostly intact except for some minor fractures. The fractures in the concrete pad may have been a pathway for the movement of contaminants to the soils beneath the property. The soils investigation indicated that some of the soils beneath the former waste piles and at other locations on the property contain concentrations of lead as high as 10,000 mg/kg above background concentrations which were observed to be below 500 mg/kg.

According to Master Metals, no land disposal of materials has occurred since the property was purchased in 1979. No information was available concerning the disposal of materials before that date other than the reported disposal of slag on the property before 1932.

Master Metals has stated that there is no equipment containing PCBs onsite and that it is not aware of any asbestos insulation within the facility. A pole-mounted transformer owned by the local utility company is located on the plant property. The utility company reportedly notified Master Metals in writing that the transformer does not contain PCBs.

Air Emission Systems

Master Metals uses 2 rotary furnaces in its secondary lead smelting process, a 13-foot by 17-foot primary furnace and a 12-foot by 15-foot secondary furnace. Emissions from the furnaces are controlled by three baghouses. A large reworked 38,000-ACFM baghouse is used to filter emissions from hoods over the furnace charge doors. Two new 15,000-ACFM baghouses have recently been installed to control emissions from the 2 furnaces. A smaller baghouse is also used to control emissions from the kettles used to refine the ingots obtained from the furnaces.

Master Metals has permits to operate two existing furnaces and the existing baghouse. The two furnaces were designated in the permit as sources P008 and P009. During 1989, the Ohio EPA issued an Order that cited Master Metals for exceeding its permitted emission rates for opacity and dust emissions on numerous occasions (Appendix E). The order required the facility to implement new controls to reduce its emissions of particulate and lead. Under the Order, Master Metals made the following improvements:

- installation of a new furnace and baghouse to replace source P008
- installation of a new baghouse to serve source P009
- installation of a capture system for the fugitive dust emissions from source P009 and the new furnace and venting them to the existing baghouse

Master Metals was also required to rebuild the existing 38,000-ACFM baghouse.

The city of Cleveland Division of Air Pollution Control (DAPC) has been authorized by the Ohio EPA to manage the state air pollution control program for the Cleveland area. Master Metals received the permit to install (PTI) for the equipment changes listed above from the DAPC on March 3, 1989 (Appendix J). The new furnace has been designated source number P010 by the DAPC. The Ohio EPA issued a PTI to Master Metals that includes emission standards for the new and existing sources on February 28, 1990.

The types of emissions that would be anticipated from this facility include lead, antimony, carbon dioxide, sulfur oxides, and particulate. Master Metals conducted a stack test on September 21, 1989, after the installation of the new equipment. The monitoring results indicated a lead emission rate ranging from 0.057 to 0.006 pounds per hours, significantly below the allowable rate of 1.14 pounds per hour. The other emissions were also significantly less than the limits set by the PTI. A permit to operate has not been issued. Master Metals should continue to work with the Ohio EPA and the DAPC to obtain a permit to operate.

The facility has submitted applications to the Ohio EPA for permits to operate the existing sources P009 and P010. However, to obtain final approval for an operating permit for P010 and meet the required standard for sulfur dioxide emissions of 3 pounds per hour and less than 15 ppm in volume, additional emission controls are needed. Master Metals installed additional emission controls in January 1990 to meet the operating permit requirements in accordance with a joint stipulation and settlement agreement with the Ohio Environmental Board of Review that was signed on December 6, 1990 (Appendix K). Master Metals installed an automatic feed system for soda ash for source P010 in January 1990. Master Metals will perform stack tests to evaluate the systems effectiveness in February 1990. Provided the proposed system can achieve compliance with the sulfur dioxide standards, the facility may be granted operating permits from Ohio EPA for P009 and P010 as early as March 1, 1991.

In addition to the point sources, fugitive emissions result from the facility's operations. Of the numerous kettles located throughout the plant, only the refining kettles are equipped with emission controls. According to Master Metals, quarterly monitoring of the ambient air is conducted throughout the facility. The results of the monitoring were not made available for review by ESC. Because of fugitive dust emissions, respirators must be worn by employees inside and outside the plant buildings.

ESC reviewed data available from the facility's 1987 and 1988 Toxic Release Inventory Form (Form R). The facility reported fugitive air emissions of 250 pounds of lead and 250 pounds of sulfuric acid each year. According to the Form R, 5,019 pounds of lead and 3,270 pounds of sulfuric acid were released to ambient air through stack emissions. These quantities account for total releases of 5,269 pounds of lead and 3,320 pounds of sulfuric acid to ambient air.

Pathways and Controls

Pathways and Controls - Surface Water

The Master Metals facility could affect surface water indirectly through its discharge to the local sewer district's sewage treatment plant. The property is drained by storm drains located throughout the facility. The storm drains all connect to the city's combined sewer system. The Cuyahoga River is approximately 0.5 mile east of the plant. It is unlikely that surface water runoff from the facility would flow directly to a receiving surface water body, however, because of the use of a combined sewer system in this area.

The effluent from the plant is regulated under provisions of the U.S. EPA effluent guidelines and standards as well as the pretreatment standards set by the NEORSD. The NEORSD has a sewer use code that sets pretreatment standards for industrial subscribers to prevent the impairment of the sewage treatment plant (Appendix C). The NEORSD conducts quarterly monitoring of Master Metals's discharge. Samples collected from the facility's effluent in April 1990 indicate that Master Metals was not meeting the NEORSD discharge limits at that time (Appendix L). The samples were collected from the facility's new pretreatment system and from the stormwater basin in the plant's process area. The concentrations of lead, copper, zinc, and cadmium (i.e., the contaminants listed in the NEORSD order filed in 1989) found in the two samples are listed in Table 1. The pH of the sample from the stormwater sump was found to be 1.2, which is well outside the required effluent range of 5.0 to 10.0 pH units. More recently, Master Metals conducted a baseline wastewater monitoring program in accordance with the compliance schedule approved by NEORSD. The results of the baseline monitoring program, conducted in August 1990, indicate that several of the facility's wastewater flows contain levels of lead above the NEORSD

Table 1

Metals Levels in the Master Metal, Inc. Wastewater (mg/l)
Cleveland, Ohio

Containment	Catch Basin	Pretreatment System	Effluent Standard
Lead	11.0	1.6	2.0
Cadmium	39.0	10.0	2.0
Zinc	158.0	36.0	15.0
Copper	54.0	0.3	3.0

discharge limits (Appendix E). The cumulative sampling results indicate that Master Metals should install an improved pretreatment system for certain wastewater flows and stormwater runoff to comply with NEORSD limits and federal pretreatment standards. The proposed wastewater treatment system, specific in the compliance schedule, will capture and treat all stormwater runoff as well as process wastewaters from the facility. As part of the proposed improvements to the stormwater collection and treatment system, Master Metals will reportedly improve drainage and repair any and all cracks and fractures in the outdoor concrete pad underlying the storage and process areas.

There are several areas throughout the plant that could cause contamination of runoff. Much of the plant's processes and material storage are conducted outside. As previously discussed, the hazardous waste storage bins may be left uncovered briefly when depositing or removing material. Rain entering any open bins could result in the entrainment of lead and other contaminants in the runoff. Runoff from the process area, as indicated by the NEORSD sampling results, could become contaminated from any dust and debris in this area. The facility has improved its management of hazardous waste drums and bins and general housekeeping practices which should minimize the release of lead and other metals to outdoor surfaces and subsequently stormwater. However, as long as hazardous waste storage and transport is conducted outdoors at the facility, it will be impossible to completely eliminate the release of these materials. Provided that Master Metals installs an adequate treatment system for stormwater and wastewater as proposed, the risk of a release of contaminants to the sanitary sewer and subsequently surface water will be minimized.

Pathways and Controls - Groundwater

Master Metals employed a consultant to install and sample four shallow groundwater monitoring wells at the facility in December 1990. The wells are located in or near former and present hazardous waste storage and handling areas (Figure 3). Groundwater samples from each of the four wells contained concentrations of lead and cadmium which exceed the Ohio maximum contaminant levels (MCL) for

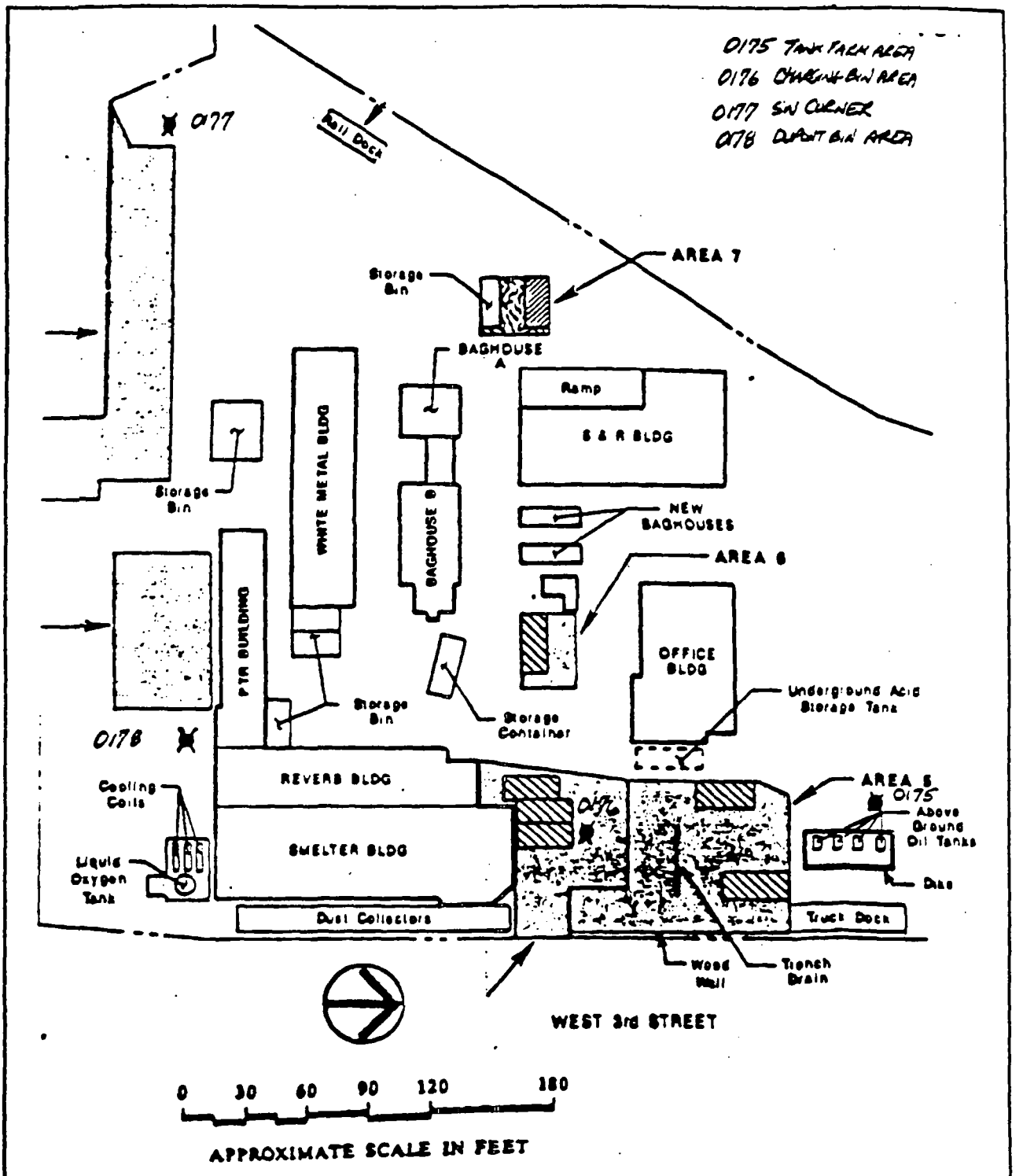

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Figure 3
Groundwater Monitoring Well Locations
at the Master Metals, Inc., Facility
in Cleveland, Ohio

inorganic chemicals in public drinking water supplies (Table 2). Two of the wells contained concentrations of chromium above the Ohio MCL. As of January 31, 1991, ESC had not received the consultant's draft report of the Phase II investigation or any relevant hydrogeological information. Without this information, it is not possible to determine if the analytical data is valid, if the source of the observed metals is onsite or is merely representative of background conditions, and the actual direction of groundwater flow. Few site-specific hydrogeologic data are available for the property. The location of the Cuyahoga River relative to the site (Figure 1) and the proximity of Lake Erie to Master Metals indicate that groundwater probably flows towards the northeastern direction below the property.

Master Metals installed two soil borings to groundwater during March 1988 (Appendix M). The exact locations of the soil borings were not known by Master Metals, but the data indicate that they were located at the northern and southern ends of the plant property.

Based on data obtained during the investigation, groundwater appears to occur at a depth of about 10 feet below the ground surface. Continuous core samples were collected to a depth of 10 feet in each borehole. The core samples indicate that the property is underlain by cinders and slag. Apparently, the property was used as a slag disposal site by the surrounding steel plant before the lead smelter was constructed in 1932.

Samples of the underlying soils were collected every 0.5 foot and analyzed for EP toxic metals. All of the samples had concentrations below the EP toxicity characteristic levels. Lead and cadmium were very near the characteristic levels (i.e., 5 mg/l and 1 mg/l) in at least 1 of the shallow soil samples. The levels for lead in the sample leachate ranged from 3.4 mg/l to less than 0.05 mg/l. Leachate levels for cadmium ranged from 0.67 mg/l to less than 0.01 mg/l.

Although the samples collected indicate that the concentrations of lead and cadmium in the slag are below the EP toxicity characteristic levels, much of the slag disposed of may have exhibited the characteristic of EP toxicity when it was initially placed onsite. Lead and cadmium, along with other

Table 2

Groundwater Monitoring Results (mg/l)
Master Metals, Inc.
February 1991

Containment	MW 175	MW 176	MW 177	MW 178	Standard (a)
Lead	0.45	0.80	1.35	0.69	0.05
Cadmium	0.026	0.074	0.087	0.03	0.01
Nickel	0.27	0.04	0.08	0.52	N/A (b)
Barium	0.05	0.02	0.04	0.04	1.0
Chromium	0.02	0.02	0.10	1.33	0.05
pH	9.86	9.15	7.44	6.80	

a/ Ohio - Maximum contaminant levels for inorganic chemicals in drinking water

b/ Not assigned

heavy metals leaching from the slag, could affect the quality of groundwater beneath the site. Furthermore, lead could have leached to the groundwater from various operations during the plant's long history as a lead smelter.

In December 1990, Master Metals employed a consultant to install and sample 30 soil borings underneath and near the property (Figure 4). ESC was provided with analytical results of the investigation (Appendix N). The samples were analyzed for pH and total metals concentrations. The result of the investigation indicate that soils beneath the southeastern corner of the property, the drum storage area, and the battery decasing area, as deep as 8 to 10 feet below grade, contain concentrations of lead exceeding 500 mg/kg. Some of the samples contained concentrations of lead exceeding 10,000 mg/kg. A sample collected at a depth of 3 to 5 feet near the southern perimeter of the property, B-10, contained 11,875 mg/kg of lead. Soil samples collected at offsite locations contained substantially lower concentrations of lead (14.7-229.0 mg/kg). The elevated levels of lead observed beneath the property may be attributable to historical onsite lead processing activities, and also may be a continuing source of lead contamination of groundwater. Other metals detected in soils beneath the site included cadmium (0.25-208.0 mg/kg), nickel (0.5-17.0 mg/kg), barium (0.5-88.0 mg/kg), and chromium (0.5-610.0 mg/kg). Soil samples collected in the vicinity of the battery cracking area at a depth of between 2 feet and 10 feet below grade were found to have a pH between 7.1 and 11.2. If any acidic liquids from battery cracking operations in this area have been released to soils beneath the concrete pad, these soils might be acidic and exhibit a low pH.

Other than the lay-down area along the northwestern perimeter of the property and the rail spur, the remainder of the site appeared to be covered with a concrete pad. The concrete pad does not have a protective coating. Numerous cracks and other potential conduits for the release of contaminants in the environment are present in the pad, including the areas used for the former piles. Contaminated runoff could potentially transport heavy metals through the concrete. The contaminated runoff could have

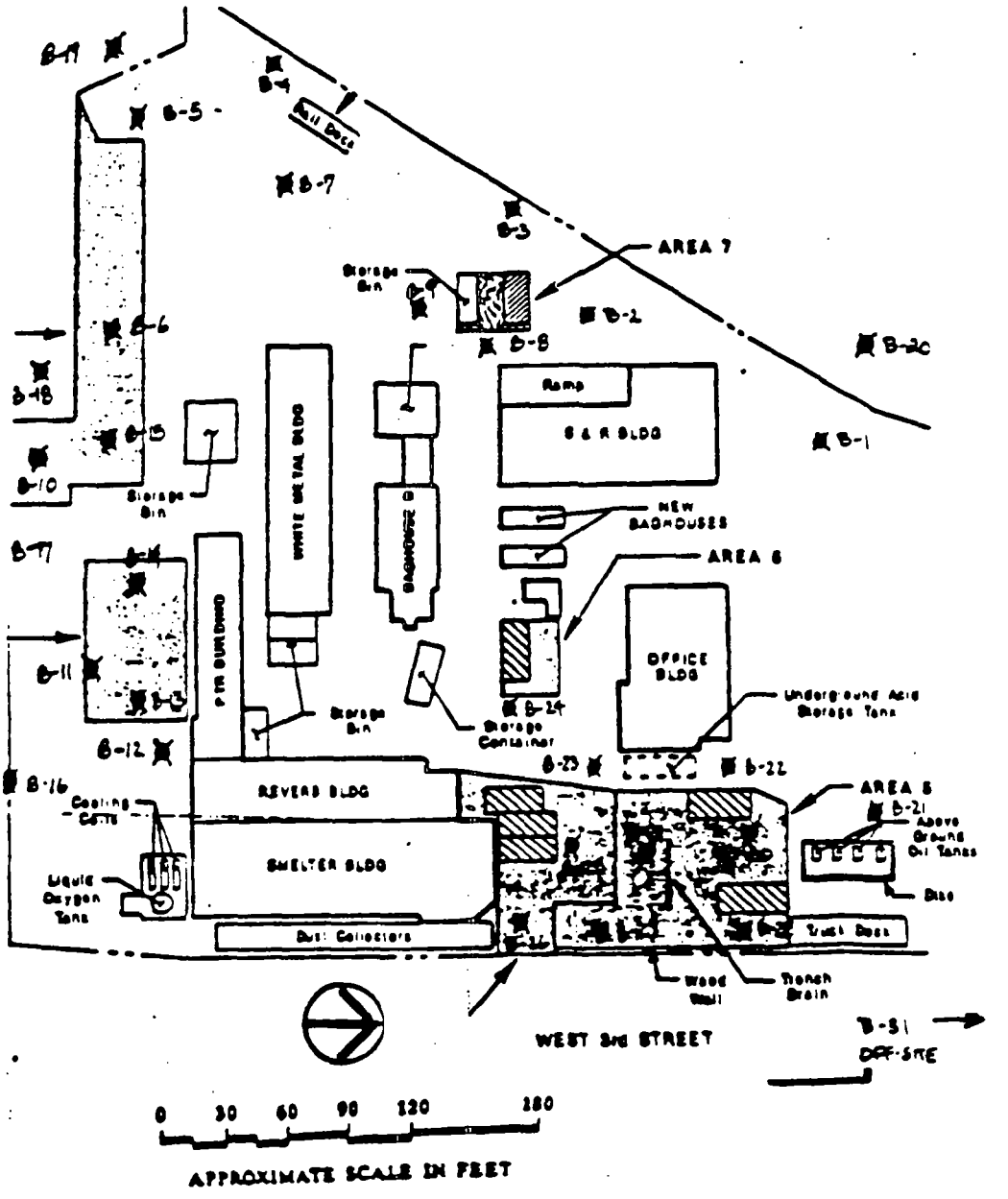

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Figure 4
December 1990 Soil Boring Locations at the Master Metals, Inc., Facility in Cleveland, Ohio

resulted from uncovered hazardous waste storage bins, the uncovered waste pile onsite, and from contaminated dust and debris located throughout much of the property.

Battery acid generated during the battery cracking operation is allowed to flow onto the concrete pad and into a concrete trench. The trench is piped to a 7,000-gallon lined underground concrete tank. The trench and piping are not equipped with secondary containment or leak detection. The integrity of the tank has not been evaluated by Master Metals. Releases from this battery acid transport and storage system could affect the underlying soil and potentially the groundwater. However, the concrete pad, the drainage system, and the collection sump were installed in 1988 and are in good condition. Battery cracking operations were not conducted in this area until after the concrete pad and drainage system were installed. Therefore, it is unlikely that releases of battery acid to the underlying soil and groundwater have occurred in this area. Given the corrosivity of battery acid, it is imperative that the concrete pad, drainage ditch, PVC pipe, and collection sump be routinely inspected and maintained to prevent the release of acidic wastes to the underlying soils.

No underground fuel storage tanks are located on the property. Master Metals removed diesel fuel and gasoline 500-gallon underground tanks in December 1988. According to facility personnel , no evidence of contamination was observed when the two tanks were removed. The tanks were constructed of unprotected steel. Facility personnel indicated that they did not have information concerning the age of the tanks.

Pathways and Controls - Air

Point sources of air emissions at the plant include exhausts from three baghouses associated with the operation of Master Metal's two rotary furnaces and one baghouse associated with the operation of the plant's refining kettles. Other emissions from the facility are fugitive in nature and include dusts from the facility storage containers and emissions from the unhooded kettles operated by the plant.

The types of emissions that could be anticipated from the facility include lead, arsenic, antimony, cadmium, copper, zinc, carbon dioxide, oxides of sulfur, and particulate. A wind rose for the area (Figure 5) indicates that the wind is predominantly from the south to southwest.

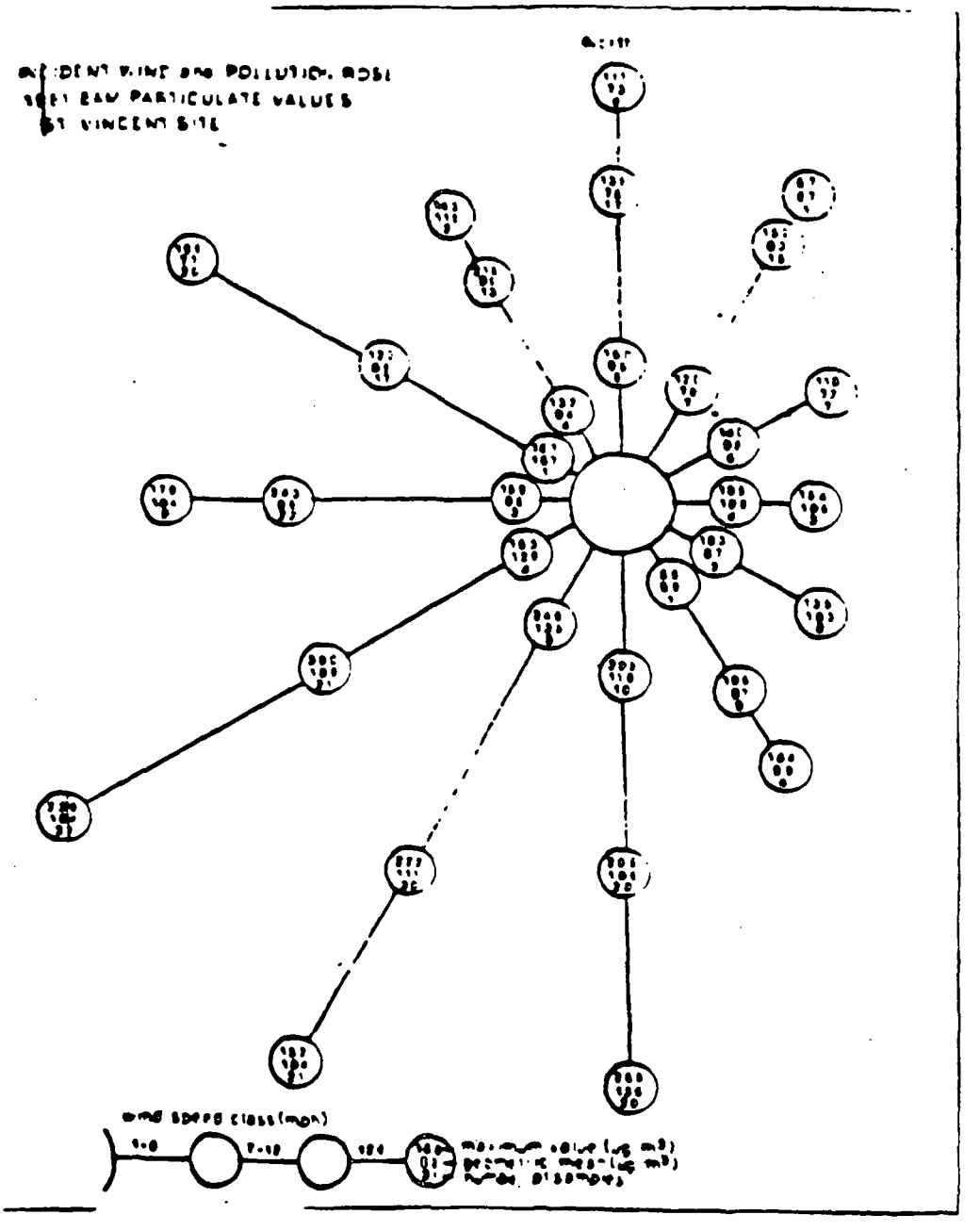
The Ohio EPA issued an Order requiring the facility to install new air pollution controls. According to the Order, Master Metals had excessive fugitive dust emissions from its furnaces and had exceeded its permitted opacity from one of the furnaces on numerous occasions during 1987 and 1988. The facility installed new pollution control equipment in 1989. The facility has applied for permits to operate two air pollution sources. Pending the installation of a treatment system for the reduction of sulfur dioxide emissions from the two rotary kilns, the facility should obtain operating permits for the two sources by March 1, 1990.

The facility should implement all necessary management and engineering controls to minimize fugitive dust emissions from the process areas. Air emissions from the facility could have affected the soil, surface water, and indirectly, groundwater offsite.

Pathways and Controls - Summary

The current risk of sudden environmental impairment because of the Pathways and Controls factor is rated as low-to-moderate. The risk rating is due to the installation of improved air pollution control equipment and the collection of battery acid wastewaters for offsite treatment and disposal. The continued risk of sudden environmental impairment should be reduced further pending the installation of an improved wastewater and stormwater pretreatment system combined with proposed improvements to the physical plant.

The risk of nonsudden environmental impairment because of the Pathways and Controls factor is rated as moderate-to-high. The risk rating is due to the occurrence of contaminated discharges to the NEORSD sewer system, and the existence of heavy metal contamination of groundwater and soils beneath the property. However, the observed contamination of groundwater may only be representative of



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Pittsburgh, Pennsylvania 15276
412-787-5100

Figure 5
Wind Rose - Cleveland, Ohio

background conditions. Additional information is required to accurately determine the source of the contamination.

Populations at Risk

Populations at Risk - General

The Master Metals facility is located in a primarily industrial area of central Cleveland. The Baltimore and Ohio Railroad switching yard is to the east and west of the plant property. The property surrounding Master Metals is owned by LTV Steel and includes operating steel manufacturing plants. The nearest residences are approximately 0.5 mile to the northwest of the facility. The nearest residences to the north, south, and east of the plant are more than one mile away. There are no critical ecological areas near the plant.

Master Metals has conducted a limited groundwater investigation. The results indicate that the groundwater beneath the site contains levels of lead, cadmium, and chromium above Ohio drinking water standards. The city of Cleveland supplies potable water for the area and uses Lake Erie as its water source. Groundwater is not used as a potable water source in the area.

The prevailing winds are from the southwest, away from the closest residences. The nearest residences to the northeast are approximately 1.5 miles from the plant property.

The plant is served by a combined sewer system. All stormwater from the site is collected in sedimentation sumps and released to the NEORSD sewer system. Wastewater from the combined sewer is treated by the NEORSD treatment plant and discharged to Lake Erie.

According to Master Metals, there have been no complaints, problems, or claims against the company from organizations in the area.

Master Metals conducts quarterly monitoring of the ambient air. Data from the monitoring were not provided to ESC for review; however, Master Metals has determined that employees working outside

the plant buildings must wear respiratory protection because of the presence of lead contamination in the ambient air. No ambient monitoring of other media is conducted by the facility. It is possible that workers at downwind locations may be exposed to point source and fugitive lead emissions from Master Metals.

Populations at Risk - Summary

The risk of sudden environmental impairment because of the Populations at Risk factor is rated as low. The risk rating is due to the use of a combined sewer system and the distance of the facility from sensitive populations.

The risk of nonsudden environmental impairment because of the Populations at Risk factor is rated as moderate. The risk rating is due to the shallow groundwater beneath the facility.

Toxicity and Behavior of Materials

Toxicity and Behavior of Materials - General

Antimony

Antimony compounds exist in the trivalent or pentavalent states. Most antimony compounds are highly toxic when ingested or inhaled. Major toxic symptoms involve the gastrointestinal tract, heart, respiratory tract, and the liver. The most serious effects are on the heart, including a decrease in heart rate and EKG effects. Death usually is due to heart failure. Inhalation exposures can result in irritation of the mucous membranes and upper respiratory tract and pneumoconiosis. Trivalent antimony compounds are more toxic than the pentavalent compounds. The LD_{50}s from oral administration of antimony trichloride were found to be 675 mg/kg in the rat and 574 mg/kg in the mouse, while for antimony pentachloride they were 1,115 mg/kg in the rat and 900 mg/kg in the mouse. NIOSH has set a 10-hour TWA of 0.5 mg/m^3.

Chronic inhalation exposure to high levels of antimony can result in pneumonitis, fatty degeneration of the liver, and a decrease in blood cell concentrations. Degeneration of the heart muscle

also has been found as a result of chronic exposure to antimony. No evidence was found in the sources searched that antimony is carcinogenic. There is some evidence of reproductive toxicity, but it is inconclusive at present.

Copper

Copper is an essential trace element in animals and plants. It occurs widely in enzymes and is critical to their function. Copper toxicity generally is not a problem in humans because absorption of the metal is poor. For example, far less than 1% of ingested copper is absorbed; practically all ingested copper is excreted in the feces. Mammals and birds generally have barriers to copper absorption. Some fish, some invertebrates, fungi, and algae are less able to control copper absorption and thus are more susceptible to its toxicity. Therefore, copper can inhibit secondary sludge treatment at treatment plants at levels of 1 mg/l, and copper compounds are used sometimes as algicides, fungicides, or antihelminthics. Some plant species have been found to adapt rapidly to locally high concentrations of copper in soils. Concentrations in natural soils generally range from 2 to 100 ppm. The EPA water quality criteria for acute toxicity to fresh water organisms for copper vary from about 12 to 43 mg/l, depending on the hardness of the water.

Copper sulfate and chloride are some of the more toxic salts of the metal. The LD_{50}s for oral administration to rats are 960 mg/kg for the sulfate and 140 mg/kg for the chloride. A number of cases of acute toxicity of copper sulfate in humans have been reported for ingestion of quantities between 1 and 12 g. Symptoms included a metallic taste, epigastric burning, vomiting, and, in severe cases, diarrhea and injury to the gastric mucosa and the liver. Chronic toxicity studies with laboratory animals have found damage to the liver, kidney, and spleen with high levels of exposure. More severe toxic responses to copper in humans can be found in individuals with Wilson's disease, a rare genetic disorder.

Copper fumes, dusts, and mists are irritants. Exposure to copper fumes by industrial workers can result in metal fume fever. The TWA for copper fumes is 0.2 mg/m^3, while for dusts and mists it is 1.0 mg/m^3. The EPA has established a secondary drinking water standard of 1 mg/l for copper.

Lead

Lead is a common metal. Lead is found at an average concentration of 10 ppm in natural soils and of 1-10 ug/l in rivers and lakes. The Ohio EPA recognizes soils containing as much as 39 ppm of lead as not being contaminated. Most lead salts are fairly insoluble in water, although lead nitrate and lead acetate are soluble. The solubility depends on the pH, with solubility increasing in more acidic conditions. Movement of lead in soils depends on its adsorption, chelation with organic matter, and the precipitation of the less soluble salts. In general, lead will react with soil anions or clays to form insoluble complexes, inhibiting its mobility.

Most human exposure to lead comes in food, with an estimated average daily intake of 100-500 mg/day. In adults, only about 8% of ingested lead is absorbed, while in children the fraction is much higher, up to about 50%. Therefore, children are at much greater risk from lead exposures. Lead also can be absorbed by inhalation, although the amount will depend on the solubility of the compound and the particle size. After absorption, lead initially accumulates in soft tissues but later accumulates in the bones. About 95% of the adult body burden of lead is in the bones, while 72% of a child's body burden is.

Poisoning from acute exposure to lead is uncommon. The primary toxic effects from chronic exposure are on the blood and the nervous system. Lead induces anemia by impairing heme synthesis (heme is the functional portion of the hemoglobin molecule) and by causing an increase in the destruction of red blood cells. The nervous system is particularly sensitive to lead, although lead induced nervous system disorders are usually only found in children. Lead also can have renal effects, damaging the proximal tubule and causing a decrease in glomerular filtration. Rats exposed to lead have developed

renal tumors; however, the evidence concerning the carcinogenicity of lead in humans is uncertain. Lead has been shown to be embryotoxic, increasing the number of miscarriages and stillbirths. The OSHA TWA for lead is 0.05 mg/m^3.

The EPA National Ambient Air Quality Standard for lead is 1.5 ug/m^3. The primary drinking water standard is 0.05 mg/l. The EPA has set an acute exposure standard of 74-400 ug/l for freshwater, depending on hardness, to protect aquatic life.

Sulfuric Acid

Sulfuric acid is a colorless, oily liquid. It is a strong acid and is highly corrosive. Its toxic effects result from this corrosivity. Sulfuric acid is a severe irritant, causing rapid tissue destruction and severe chemical burns. It shows no systemic toxicity effects from ingestion. Sulfuric acid is a powerful oxidizer and can ignite or explode on contact with many materials. Because the effects of sulfuric acid are due to its corrosivity, they are diminished with dilution. Impacts on the environment tend to be mainly from large sudden releases.

Toxicity and Behavior of Materials - Summary

The risk of sudden environmental impairment because of the Toxicity and Behavior of Materials factor is rated as moderate. The risk of nonsudden environmental impairment because of the Toxicity and Behavior of Materials factor is rated as moderate-to-high because of the large amounts of lead at the facility.

Management and Practices

Management and Practices - General

The site is enclosed by a 10-foot high chain link security fence. The fence has two gates with the south gate normally locked and the motorized north gate controlled by Master Metals personnel. The facility does not have security guards onsite, but does employ a security service, Regency Security

Systems. Regency patrols the area and makes unscheduled visits to the property between the hours of 8:00 p.m. and 5:00 a.m. each weekday and all day on weekends and holidays. Regency also keeps a security guard on call 24 hours per day.

The plant superintendent is responsible for routine housekeeping of the plant grounds. Housekeeping of the plant grounds is generally quite good, particularly in all of the hazardous waste storage areas. The Environmental Administrator performs a daily inspection of all hazardous waste storage areas. Master Metals has dedicated four personnel to full-time cleanup of all hazardous waste storage and processing areas. Cleanup personnel reportedly work continuously to cleanup spills as soon as they occur. The clean-up crew uses a vacuum sweeper for cleaning up spills on a continuous basis. However, some improvements can be made in some of the indoor processing areas and the maintenance shop. Lead debris was observed on the floors of some processing areas. Scrap machinery and lead scrap in open drums is stored on bare ground in the lay down area adjacent to the northwestern property boundary. Housekeeping practices in these areas should be improved. However, in general, improved management and housekeeping practices have reduced the potential for the release of contaminated runoff from these sources.

Maintenance of the plant's production equipment, including the furnaces, baghouses, and mobile equipment, such as forklifts, is performed by Master Metals personnel. The inspection and maintenance of the plant's fire extinguishers are performed by an outside contractor.

Master Metals has developed a written preventive maintenance plan for the plant's baghouses. The air emission sources are shut down at about 2:00 p.m. each day. Facility employees then inspect the baghouses. Repairs are completed according to the preventive maintenance plan.

Material storage takes place throughout the site. Solder dross, fire brick, and some scrap materials are stored in drums and other small containers in the drum storage yard located at the southwestern corner of the property (Figure 2). Air pollution control dusts and some scrap materials are stored in 90-cu yd

bins near the production area. Batteries are staged in the battery decasing area, and the plates are stored nearby in 90-cu yd bins. Finished products are stored in the shipping and receiving building.

Diesel fuel, gasoline, hydraulic fluid, and waste oil are stored in aboveground tanks inside a secondary containment structure. A liquid oxygen tank is maintained at the southeastern corner of the property. The inground concrete sump which receives characteristic hazardous wastes and the aboveground storage tanks are regulated pursuant to RCRA. Although this is an interim arrangement, Master Metals should comply with the RCRA requirements or obtain a variance from the Ohio EPA.

The facility has developed inspection forms and inspects the plant on a daily basis for waste inventory, transfer equipment condition, and evidence of a release. Personnel also inspect the facility on a weekly basis for the condition and management of the drum storage area, concrete surfaces, the emission control systems, plant security, and safety equipment.

According to Master Metals, an Occupational Safety and Health Administration (OSHA) right-to-know and hazardous waste training program is provided for the plant employees every six months. The training includes the proper use of respiratory equipment. Master Metals has implemented a health monitoring program that includes the analysis of employee blood samples for lead levels and quarterly personal air monitoring. The Health and Safety Director is responsible for administering the health and safety program and complying with all applicable OSHA standards.

According to facility personnel, they submitted all applicable Superfund Amendment and Reauthorization Act (SARA) Title III reports, including those required under Sections 311, 312, and 313. According to the Section 313 report, 5,269 pounds of lead and 3,520 pounds of sulfuric acid are released to the ambient air. Approximately 487,550 pounds of lead-contaminated waste were disposed of in landfills during 1987.

Master Metals has developed an emergency preparedness plan as part of its Part B application. The plan has not been implemented because the incident requiring its use has not occurred. No significant fires or explosions have occurred at the plant since its purchase in 1979.

Master Metals undergoes a number of routine regulatory inspections. The DAPC visits the facility to observe the plant's air emissions approximately every 30 days for opacity. The DAPC observes emissions from Master Metals and the surrounding area on a weekly basis at a minimum. An Ohio EPA RCRA inspector visits the site once every year. The plant is visited by the NEORSD every quarter. The EPA inspected the facility most recently in July and August 1990 to evaluate the facility's compliance with the Consent Decree.

Regulatory Contacts

Larry Adoloff, Supervisor, Northeast Ohio Regional Sewer District, Industrial Waste Section, (216) 641-6000

According to Mr. Adoloff, Master Metal's wastewater and stormwater are discharged to a combined sewer system. The wastewater and stormwater are treated at the sewer district's Westerly plant, which is located approximately five miles from Master Metals and discharges wastewater to Lake Erie. Mr. Adoloff said that samples of the discharge from the facility collected in October 1990 contained concentrations of lead in excess of both the federal categorical and NEORSD pretreatment standards. However, Mr. Adoloff is hopeful that Master Metals will be able to meet all applicable standards with the installation of the planned treatment system.

No other regulatory contact familiar with the site could be reached.

Management and Practices - Summary

The risk of sudden environmental impairment because of the Management and Practices factor is rated as low-moderate. The risk rating is due to the facility's noncompliance with the sewer use ordinance.

The risk of nonsudden environmental impairment because of the Management and Practices factor is rated as moderate. The risk rating is due to historical practices and lessened by improved housekeeping practices in some areas of the plant.

Table of Risk Rankings

	Sudden	Nonsudden
Pathways and Controls	low-to-moderate	moderate-to-high
Populations at Risk	low	moderate
Toxicity and Behavior of Materials	moderate	moderate-to-high
Management and Practices	low	moderate
Overall Facility Risk	low-to-moderate	moderate-to-high

Conclusions and Recommendations

Conclusions

ESC has evaluated the Master Metals facility in Cleveland, Ohio, by means of a site visit, review of documents supplied by Master Metals, and interviews with company representatives and a local regulatory agency. The company operates a secondary lead smelter that manufactures lead and lead alloys from used steel-cased batteries, lead solder dross, lead-contaminated baghouse dust, and other scrap materials. ESC finds that if the facility implements all planned improvements to air emission and wastewater systems, the facility will reduce the environmental risk of its operations. The overall risk of sudden environmental impairment is rated as low-to-moderate, and the risk of nonsudden impairment is moderate-to-high.

The primary risks associated with the facility are the potential release of contaminants to air and groundwater. Indirect contamination of surface water from the facility could occur through seeps of groundwater to surface water and affects to the local sewage treatment plant.

Because of the age and condition of the concrete pad beneath the waste management areas and process areas, as well as the historical management of waste piles, storage bins, and battery decasing area, the risks of soil and groundwater contamination are high.

A soil and groundwater investigation of the facility conducted in December 1990 indicated that soils beneath parts of the property contain elevated concentrations of lead relative to observed background concentrations and that the groundwater beneath the site contains concentrations of lead, cadmium, and chromium at levels exceeding Ohio state drinking water standards. Historical lead processing operations at the facility may have contributed to the elevated lead concentrations in soils, which may be a continuing source of lead in the groundwater beneath the site. However, the metals present in the groundwater beneath the site may only be representative of background concentrations.

The improper historical management of the lead-contaminated materials resulted in a prevalence of fugitive air emissions. These emissions may have contributed to contamination of soil offsite.

Based on ESC's review, current management practices for handling raw and waste materials are a significant improvement over historical practices.

The site is located in a heavily industrial area of central Cleveland. The area is served by a central water and sewer system.

Recommendations

The following recommendations, if implemented, would help minimize the risk of environmental impairment from the Master Metals facility.

1. The company should continue to comply with the requirements of the Consent Decree, including the proper closure of all of the waste piles onsite in accordance with the proposed closure plans which are awaiting approval from the Ohio EPA.
2. Master Metals should manage all of its storage containers bins in accordance with the Consent Decree and RCRA requirements for containers. Bulk storage containers must be managed in a manner to prevent the release of hazardous waste from the bins through fugitive dust emissions, routine spills, and stormwater runoff. The facility should ensure that the management of its containers complies with Subpart I of 40 CFR 264. Storage bins that do not meet the standards for containers, as specified in the Consent Decree, should be replaced.
3. The facility should comply with 40 CFR 265 Subpart J or inquire with the Ohio EPA regarding its current collection of battery cracking wastewaters in the inground sump to ensure it is in compliance with applicable Ohio hazardous waste regulations.

4. Master Metals should review the integrity of the concrete pad underlying the waste storage areas, process areas, and battery decasing area. Any cracks, joints, or other potential conduits should be sealed to prevent migration of lead and other contaminants to the underlying soil. The pad and trench located in the battery decasing area should be provided with a protective coating that will prevent corrosion of the concrete and eventual migration of contaminants to the soil.

5. Master Metals should inspect the battery acid sump and liner for integrity. If the liner or sump is not intact, the facility should repair or reduce the damaged equipment. Integrity inspections of the tank, liner, trench, and associated piping should be included in the facility's inspection schedule.

6. Master Metals should test the sulfur dioxide control system for emission source P010 as planned so that a permit to operate can be obtained as soon as possible.

7. The facility should augment its groundwater monitoring program as part of its closure program to accurately determine what affect the operations of the surrounding facilities, the disposal of the slag, and Master Metal's operations may have had on the groundwater beneath the property.

8. The facility should implement management and, potentially, further engineering controls to reduce the fugitive dust emissions from the process areas.

9. Master Metals should inspect the integrity of the secondary containment structure for the tank farm. Any potential conduits to contamination should be sealed. The facility should make arrangements for the removal and treatment of ponded stormwater in the tank farm. A drain equipped with a valve should be installed at the lowest point in the tank farm to drain uncontaminated stormwater following storm events.

10. Master Metals should proceed with the design and construction of the proposed wastewater treatment system as specified in the compliance schedule approved by NEORSD.